TECHNICAL INFORMATION

BULLETIN No.110.

(TYPE)

TECHNICAL DESCRIPTION AND ADJUSTMENT PROCEDURE

OF

DAVENTRY "ISOMATIC" 7-VALVE

ALL WAVE RECEIVER.

"7AW"

30 April 1936

RECEIVER

COLLIER & BEALE LTD.

WELLINGTON

7 AW
"ISOMATIC"

TECHNICAL DESCRIPTION AND ADJUSTMENT PROCEDURE

OF

DAVENTRY "ISOMATIC" 7-VALVE

ALL WAVE RECEIVER.

The new "DAVENTRY" All Wave Receiver is a sufficiently far departure from the conventional type, that a general description of the novel features involved is considered desirable.

The new Receiver is a 7-Valve 3-band Metal Tube Unit. The various band coverages are :-

First Series:

(1) 550 to 1600 Kilocycles.
(2) 2,100 to 6,800 "
(3) 5,600 to 16,000 "

Second Series:

(1) 550 to 1600 Kilocycles.
(2) 2,100 to 6,800 "
(3) 6,500 to 19,500 "

The Main feature of this Receiver is the Unit Coil Assembly, or "Catacomb", which permits a grouping of the individual and corelated parts of this section, without in any way being dependent on chassis wiring.

One of the features of this Assembly is the novel and low loss method of interstage couplings. In the Broadcast and medium wave ranges, a co-axial conductor is used. In other words, the grid connection is made by a copper tube of certain diameter; the plate connection from the same coil is brought down inside this tube for two very important reasons:

(1) To eliminate the inevitable capacity which would exist between the plate or antennae lead and ground, which capacity constitutes the greatest loss in modern Receivers.

(2) To provide the requisite coupling capacity between stages.

The capacity of the broadcast tube and lead is 5.4 Mmfd. The intermediate Short Wave tube is 4.2 Mmfd. The same idea of eliminating undesirable losses is behind the use of the same method in the short wave antennae circuit. The high potential end of this circuit is adequately shielded right to the antennae lead, and by virtue of the capacity introduced by this shield, provides the antennae coupling condenser. The value of coupling capacity introduced is 13.2 Mmfds.

That the above ideas contribute to the performance of the Receiver can easily be proved by comparison with any other make of Unit using a conventional coil assembly.

In the first series of this Receiver released, the high frequency short wave band extended down to 16 Megacycles. Later Units have the high frequency short wave band further extended to 19.5 Megacycles, and have also additional decoupling circuits to prevent instability and hand capacity at the very high frequencies, and to remove entirely modulation of the power supply caused by variations in frequency at a periodic rate in the oscillator circuit. This instability is made evident by a "motor-boating" effect, when tuned to powerful short wave carriers, having little modulation and with the volume control well advanced. The complete removal of this effect has been accomplished by such new parts and altered circuit, as shown on data sheet attached.

ALIGNMENT PROCEDURE: Sufficient detail has been shown on the schematic diagram to permit the intelligent adjustment of this Receiver, if and when found necessary. The alignment procedure should be carried along general lines. The method adopted at the Factory may be of value, and such is described.

Always check the I. F. Amplifier first. The intermediate frequency used is 465 Kilocycles. The procedure is to apply the test signal at the first detector, and align both Transformers at the one setting. The type of trimmer base used will rarely show any variation even after long periods of use. Adjustment is fairly critical, due to the large capacity change with small screw movements. After alignment of the I. F. Amplifier, the Receiver should be checked for general performance, before attempting any adjustment of the trimmer and padding condensers. Generally, any error in alignment will be evident by the incorrect pointer setting. The pointer setting should be on the "diameter marks", with the condenser plates fully meshed. Greatest variation of the high frequency or trimming condensers, will be found

in the oscillator section. This section has the highest fixed capacity, which necessitates fairly tight trimmers. Variations, through temperature change or vibration, are possible. Alignment of the broadcast section should be undertaken first.

IMPORTANT NOTICE: When making any adjustments to this Receiver, see that an antennae, or the equivalent of an antennae, is connected to the aerial lead.

As is usual, T.3, or the oscillator trimmer, decides the pointer indication. A test frequency of 1500 or 1600 Kilocycles should be used. After correct pointer setting, T.1 and T.2 should be adjusted for maximum response. The Receiver should now be turned to 600 Kilocycles and, without using a test signal but still having an antennae or "dummy" connected, proceed to adjust the broadcast padding condenser - P. C. 2.

The correct setting of this Padding Condenser can quite readil be obtained by the maximum level of the hiss or Receiver noise. If this adjustment has necessitated a large change, it will be necessary to recheck the oscillator trimmer - T.3. The same procedure should be adopted with the intermediate short wave band. In this case, the oscillator trimmer is T.6; the padding condenser P. C. 3. Test frequencies of 6.5 and 2.5 Megacycles should be used. In the high frequency short wave band, the general procedure, as used in alignment of the broadcast frequency range, should be adopted. The oscillator trimmer, in this case, is T.9; the padding condenser P. C.1.

In adjustment of the oscillator trimmer, a certain amount of care is required, as very slight movements will have a large effect on the frequency that this circuit tunes to. Care is particularly necessary in adjustment of the series 2 machines, extending to 20 megacycles. Test frequencies for the 16 megacycle machines should be 16 megacycles and 6.5 megacycles. In the 20 megacycle Units, 19 megacycles and 6.5 megacycles. In all the above ranges, the middle position of the gang condenser should be checked. This can be undertaken quite simply by the addition of a small fixed capacity to each condenser section in turn, and noting whether such addition increases or decreases the output. If one section shows an increase, it logically means that this particular section requires additional capacity, which can usually be traced to distorted plates.

Distorted plates are usually quite obvious, and can normally be rectified by the careful application of a screw-driver or similar instrument. If all sections show a reduction in output, the Receiver can be considered in satisfactory alignment.

A suitable checking capacity can be made by fitting a 1" length of $\frac{3}{8}$" diameter brass tubing to a piece of bakelite or ebonite rod. This, if laid on the stator plate connection straps, will provide sufficient additional capacity.

In making the mid-position adjustments, it is imperative that the antennae or "dummy" antennae be still connected, and preferably use only the Receiver noise or hiss as the indicating medium. For general guidance, it can be safely stated that variations in either the antennae or interstage trimmers, or the padding condensers, is extremely unlikely. Readjustment of the oscillator trimmers, however, may be found necessary.

Defects in the Catacomb Unit are unlikely, but in the event of such occurrence, the whole Unit should be removed and returned to the Factory for repair or replacement.

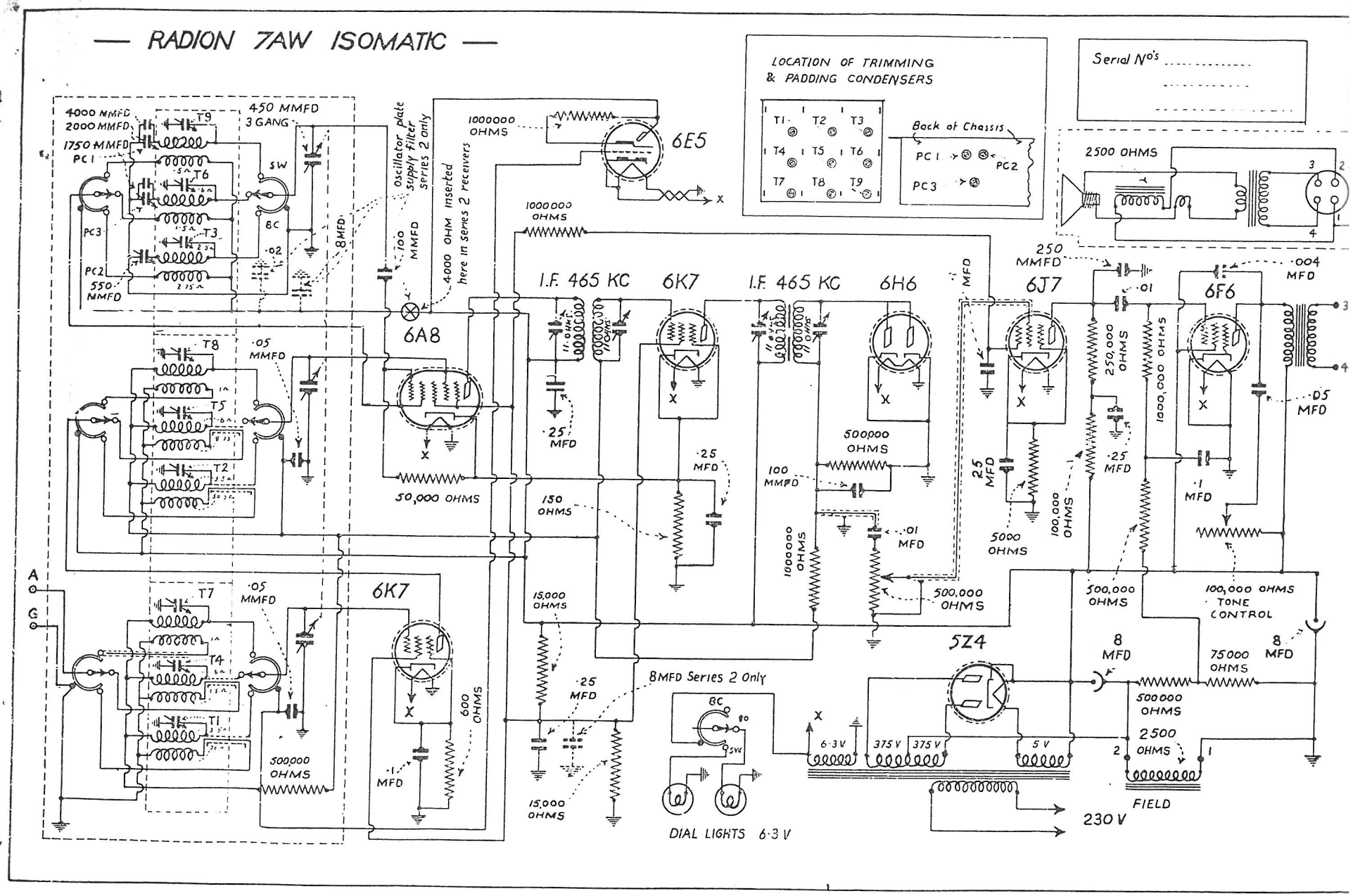
This Unit can quite readily be removed by unsoldering the six wires that supply the various operating potentials, and removing the four holding-down nuts, in the angle supporting bars of the "Catacomb" Unit.

Circuit diagram and data sheet, is on separate leaf attached.

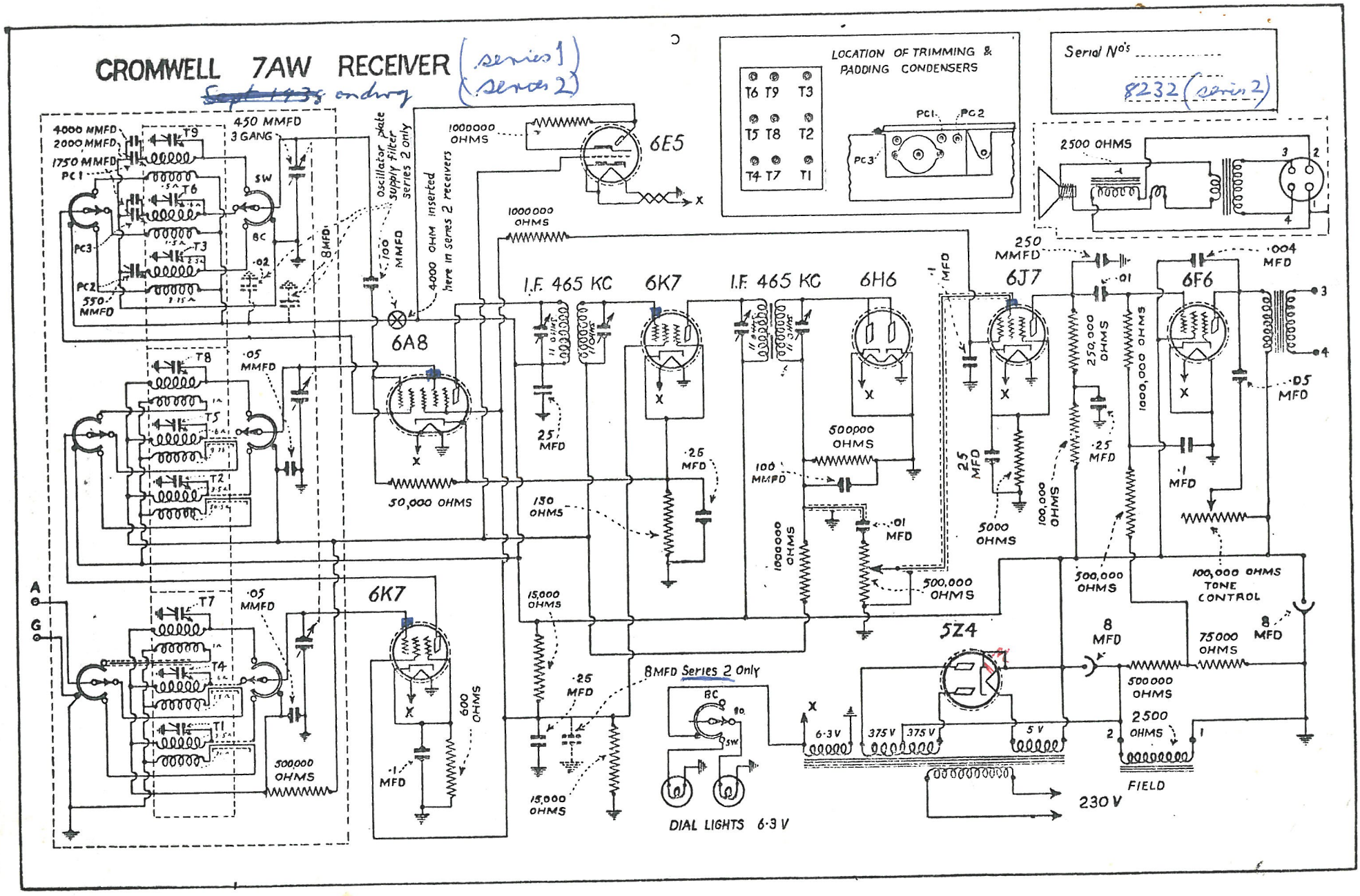
COLLIER & BEALE LIMITED,
66 GHUZNEE STREET,
WELLINGTON C.2.
30th April, 1936.

IMPORTANT NOTE:- The majority of this Model Receiver have been fitted with the "Metal Glass"Type 6A8. It is important to note that when changing this Tube to the more recent full Metal type, readjustment of the Oscillator and 1st Detector circuits becomes necessary. This readjustment is caused by the large difference in input capacities of the two Tubes.

A further modification may also be required if by the use of this Metal Tube, instability in operation is encountered. Instability is possible, due to the much higher mutual conductance of the Metal Tube over the Metal Glass Type. The instability will generally be made evident by a condition of reaction, or in some cases oscillation taking place, when the Receiver is tuned to approximately 500-Kilocycles. In some cases reaction may be noticed on the short wave bands as well. A suggested remedy to overcome this effect, is to increase the bias resistance controlling the 1st Detector and I.F. Valves. This normally, in Receivers fitted with the Metal Glass 1st Detector, is 150-Ohms., and in cases of instability should be changed to 300-Ohms.

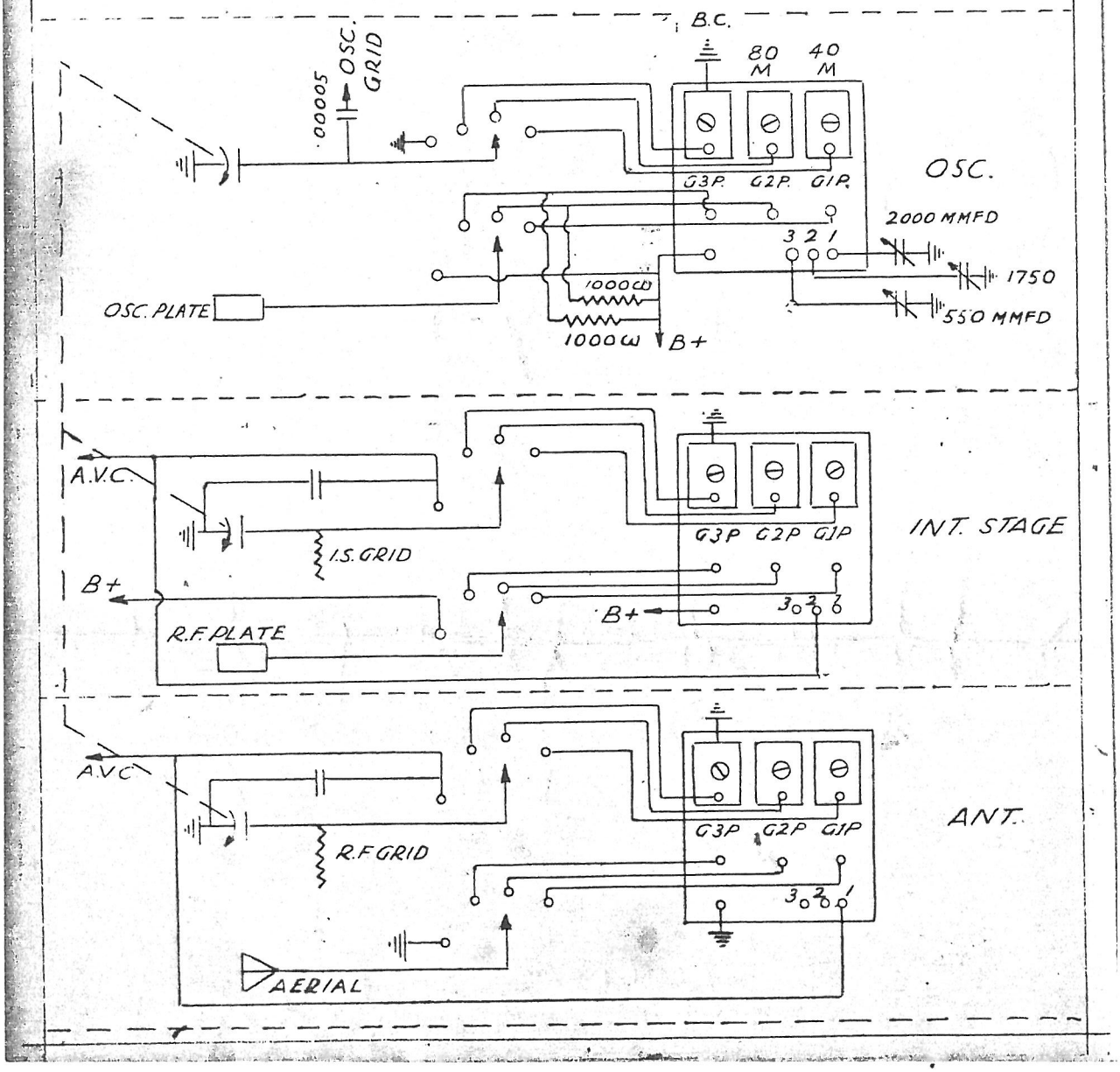


7AW Isomatic


CROMWELL 7AW RECEIVER (series 1) (series 2)
~~Sept 1939~~ onwards
LOCATION OF TRIMMING & PADDING CONDENSERS
T6 T9 T3
T5 T8 T2
T4 T7 T1
PC1 PC2
PC3
Serial No's .....
8232 (series 2)
2500 OHMS
4000 MMFD
2000 MMFD
1750 MMFD
PC1
450 MMFD 3 GANG
SW
BC
.02 MFD
PC3
PC2
550 MMFD
oscillator plate supply filter series 2 only
100 MMFD
4000 OHM inserted here in series 2 receivers
1000000 OHMS
6E5
1000000 OHMS
I.F. 465 KC
6K7
I.F. 465 KC
6H6
6A8
.05 MMFD
T8
T5
T2
50,000 OHMS
25 MFD
130 OHMS
.25 MFD
500000 OHMS
100 MMFD
.01 MFD
500,000 OHMS
1000000 OHMS
.1 MFD
250 MMFD
6J7
.01
6F6
.004 MFD
.05 MFD
250,000 OHMS
1000,000 OHMS
25 MFD
5000 OHMS
100,000 OHMS
.25 MFD
.1 MFD
A
G
T7
T4
T1
.05 MMFD
6K7
500,000 OHMS
.1 MFD
600 OHMS
15,000 OHMS
.25 MFD
15,000 OHMS
8MFD Series 2 Only
BC
SW
DIAL LIGHTS 6·3 V
5Z4
6·3 V
375 V
375 V
5 V
230 V
500,000 OHMS
100,000 OHMS TONE CONTROL
8 MFD
75000 OHMS
8 MFD
500000 OHMS
2500 OHMS
FIELD

7AW

CONNECTION SCHEME FOR USE WITH TYPE A.W.3 COIL ASSEMBLY AND CENTRALAB "WAVE CHANGE SWITCH.



MODEL TAW?

Cromwell 7AW. SN A5027. Photo: James Davidson


CROMWELL
N.Z. BUILT QUALITY RADIO
TYPE 7 A W NO A 5027
DISTRIBUTORS FOR N.Z.
H. W. Clarke Ltd., Wellington
CAUTION! DO NOT TOUCH ANY INTERNAL PART OF
THIS MACHINE UNLESS THE POWER PLUG OR ADAPTOR
IS WITHDRAWN FROM THE ELECTRICAL SUPPLY